

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

aSB608
P65563

FROM FANNIE

STA/STA



Southern Pine BEETLE NEWS

No. 7/APRIL, 1977

NEWSLETTER HAS NEW FORMAT

This newsletter is now being produced by Information Management at the U.S. Forest Service's Southern Forest Experiment Station in New Orleans. The format has changed and the purpose, we believe, has been strengthened.

The newsletter will report on findings of interest in an effort to inform readers of developments that concern the Program. Also, it will discuss workshops and similar events that deal directly with the Program's progress. When other relevant information is available, it will be reported.

We welcome the service of Information Management and look forward to an informative and enjoyable newsletter. As always, we invite comments and encourage participation from all readers.

Communications concerning the newsletter should be made through Bob Thatcher, Program Manager.

Information suitable for future newsletters, press releases or feature articles will be handled by the New Orleans IM staff.

Site and Stand Characteristics Listed for Southern Arkansas

An investigation began in 1975 to evaluate site and stand characteristics associated with beetle infestations in Arkansas. The goal is to relate the infestations to all environmental factors. From this information, hazard-rating models can be developed.

After 18 months more than 1000 variable radius study plots have been established. Preliminary results show that attacked trees are of poorer vigor than healthy ones. This is indicated by smaller size and crown, thinner bark, and slower growth. Attacked stands have more pine stems per acre and occur on poorer sites. Also, disturbances were recorded in 82 percent of the attacked plots and in only 57 percent of the controls. Principal disturbances were lightning and logging activities.

It is suggested that beetle attack is associated with high density, young stands, a large number of pine stems, and drier sites with more sand content.

The study is continuing and silvicultural recommendations will be forthcoming.

KU, T. T., J. M. SWEENEY, and
V. B. SHELBURNE.

1976. Preliminary evaluation of site and stand characteristics associated with southern pine beetle infestations in Arkansas. Arkansas Farm Res. 25.

Root Infection Increases Beetle Attack Probability

A comparison of root systems of two trees indicates that severe infection by *Fomitopsis annosa* causes a reduction in growth and vigor and may predispose trees to attack by bark beetles. The tree with less infection was not attacked, while the level of infection was almost twice as high in the attacked tree. Further study will add to this preliminary report of the 54-month investigation to determine the role of *F. annosa* as an agent leading to the attack of loblolly pine by the southern pine beetle.

The procedure is to excavate the entire root systems of paired loblolly pines, one attacked and one adjacent nonattacked of similar size. Each exposed root one-eighth inch or larger is tagged, mapped, and listed as healthy, resin-soaked or stringy (symptoms of *F. annosa* infection). Annual tree growth measurements are also being taken.

Prior to excavation, neither tree showed evidence of infection, but it was found that 37 percent of the primary roots were infected for the attacked tree. The nonattacked had 19.5 percent. The attacked tree had a total radial growth of only 4.92 mm during the last 5 years and 7.6 mm during the previous 5. The nonattacked tree grew 14 and 14.5 mm in the respective periods.

Skelly, J. M.

1976. Levels of *Fomitopsis annosa* in root systems of southern pine beetle attacked versus non-attacked trees. Proc. Southwide For. Dis. Workshop, Atlanta, GA. June 15-17, 1976. USDA For. Serv. Southeast. Area, S&PF. 2 p.

Fertilization Shows Little Effect On Southern Pine Beetle Attack

In a survey of 176 fertilization study areas in eight states, it was found that single tree attacks were common in overstocked stands. Fertilization in dense stands with 100 pounds of nitrogen per acre increased growth of larger trees but induced mortality of suppressed trees. Beetles may have a natural role in this mortality since they attack low-vigor trees.

Also, southern pine beetles seemed to be associated with black turpentine beetles in thinned plots. Thinning, normally prescribed as a preventive treatment for overstocked SPB-prone stands, may have increased SPB activity.

The theory that fertilized loblolly pine might be less prone to attack was not supported, mainly due to the lack of SPB activity on the study sites. Only four percent of the stands surveyed had active infestations, and 53 percent of these were single-tree. Single-tree infestations were confined to trees labeled suppressed at the time of the study and to those that lost 50 percent of their crowns to ice damage.

The 31 single-tree infestations were scattered among fertilized and nonfertilized plots. Sixty percent of the infested plots had received 100 pounds or more of nitrogen while the other 40 percent had received phosphorus, 50 pounds of nitrogen, or no fertilizer. It is apparent that fertilizer treatment had little identifiable effect on beetle activity.

HAINES, L. W., S. G. HAINES, and
F. T. LILES, JR.

1976. Effects of fertilization on susceptibility of loblolly pine to the southern pine beetle. Sch. For. Res., For. Fertiliz. Coop. Tech. Rep. No. 58. 55 p. N. C. State Univ., Raleigh.

Workshop Participants Define Common Characteristics In Infestations

High stand density, reduced growth and disturbance by lightning are common characteristics in beetle infestations. This is one of the conclusions reached by investigators who attended a site/stand workshop last December in Atlanta.

Investigators from throughout the South met for two days to discuss their methods, data, and future research.

Conditions in the Georgia Piedmont seemed to differ from those in the Atlantic and Gulf Coastal Plains. In the Piedmont, the abundance of shortleaf pine and soil conditions associated with littleleaf disease sites seem to be major factors in beetle attack.

Across the South, however, soil characteristics appear to have few similarities that can be related to attack.

Many investigators reported that disturbances were a major contribution to attack. Lightning was the most frequent disturbance in Louisiana, Arkansas and Texas. But all investigators felt that *F. annosa* infection should also be examined as a predisposing factor.

The regional site/stand data analyst presented summaries based on data he had received. He pinpointed the high incidence of beetles in natural stands across the South, and the predominance of disturbance factors in the Coastal Plain. His analysis indicates that 70 percent of the undisturbed Coastal Plain spots are one-quarter acre or less. Eighteen percent of these have only one infested tree while 74 percent have 25 or less. He also noticed a beetle preference for loblolly over shortleaf pine on these sites.

The desire to integrate site/stand data with population data was discussed, but planning was deferred to an integration meeting scheduled in Atlanta for February.

Laboratory Assay Now Available For Behavioral Chemicals

Finding the effect of behavioral chemicals in the field is hindered by uncontrollable variables such as competitive odor sources, beetle distribution, and seasonal variation in beetle response and environmental conditions. Thus, reliable laboratory procedures have been needed.

An olfactometer has been developed to fill this need: a simple open-arena design that uses walking insects. This will be useful to behavioral chemical research — a potential tool for southern pine beetle management in both population survey and pest suppression.

A feature of the apparatus is a motor-driven device that permits continuous release of the chemical into a single air stream. A room for the device is designed to eliminate all external stimuli and regulate both temperature and humidity.

The approach has been used successfully to establish a dosage-response curve for the attractive mixture of frontalin, *trans*-verbenol, and loblolly turpentine. Most beetles responded to the higher rates of the chemical by walking toward the odor source, and some made contact with the air outlet. Response by females was generally lower than that of males.

PAYNE, T. L. et al.

1976. Olfactometer for assay of behavioral chemicals for the southern pine beetle. J. Chem. Ecol. 2 (4): 411-419.

Alternative Insecticides Now Being Rated

The two insecticides used against the southern pine beetle, benzene hexachloride (BHC) and its gamma isomer lindane, may not be available in the near future. Like other insecticides that affect many organisms and break down slowly, these may be forced off the market due to environmental constraints. The search is on for alternative compounds.

Twenty-nine compounds with short to medium residual properties have been screened in an effort to find those alternatives. Seventeen of these were more toxic than lindane.

Test insects were obtained from infested bark of loblolly pine growing on the North Carolina Piedmont. A method for holding the insects after treatment is described that considers living conditions, easy removal, exclusion of extraneous effects, and discouragement of aggressive behavior.

HASTINGS, F. L. and A. S. JONES.

1976. Contact toxicity of 29 insecticides to southern pine beetle adults. USDA For. Serv. Res. Note SE-245, 4p. Southeast For. Exp. Stn., Asheville, NC.

Alternatives To Lindane Discussed at January Workshop

A workshop was held last January in New Orleans to discuss progress in toxicant research.

For preventive sprays, it was decided that chlorpyrifos, if applied properly, will give adequate protection at concentrations of 1 and 2 percent. All studies in 1976 at these levels were at least 90 percent effective through 120 days. It was also suggested that a 0.5 percent concentration might be adequate for protecting healthy trees.

It was decided that investigators would continue to determine the efficacy of both chlorpyrifos and chlorpyrifos-methyl. The latter compound, although two years from registration with the EPA, is as effective as lindane and has a lower mammalian toxicity than either lindane or chlorpyrifos. U. E. Brady and C. W. Berisford indicated that in Georgia chlorpyrifos-methyl at 1 and 2 percent was more effective than 0.5 percent lindane or 1 and 2 percent chlorpyrifos through 120 days. W. W. Neel and J. Lashomb said that in Mississippi it was at least 90 percent effective through 35 days at 0.5, 1 and 2 percent concentrations.

For remedial sprays, I. Ragenovich of North Carolina indicated that chlorpyrifos caused a significant reduction in the number of emerging adults. The Mississippi

data showed no difference between chlorpyrifos and chlorpyrifos-methyl. The efficacy for all applications was 90 percent, compared to 50 percent for lindane. F. L. Hastings and A. S. Jones of North Carolina reported similar findings for chlorpyrifos-methyl and lindane.

Dr. Henry Gray of Dow Chemical Company reviewed the registration process and estimated 1979 to be the earliest date for registration of chlorpyrifos-methyl. He suggested early 1978 for chlorpyrifos. It was decided, therefore, to pursue registration of chlorpyrifos but continue the effort to register chlorpyrifos-methyl because of its lower mammalian toxicity.

Application procedures were discussed and it was determined that 300 psi would be the most productive pressure. To lessen spray drift, Brady and Berisford will further evaluate the use of Velsicol's Accutrol Gun.

Brady is now preparing instructions for collecting and preparing bark samples for residue analysis.

Beetles Traced With Phosphorus 32

A new method of tagging beetles has proven effective in both the laboratory and the field. With radioisotope tagging, dispersal of beetles from one host tree to another can be traced. Emerging beetles pick up and carry the tag — Phosphorus 32 in an aqueous glycerine suspension — and leave most of it in the pitch tube of the new host tree.

This technique was developed to help determine beetle emergence from downed trees, and to see if they originate or add to new infestations. But the technique can also be used for dispersion and migration studies.

The tagging material had to meet certain requirements: it had to soak into the bark or stick to the outside and adhere to emerging adults, it had to remain active and be detectable, and it could not influence beetle behavior.

Laboratory tests proved that the material would be picked up and would not influence normal behavior. The technique was then field tested in a cage. Tag counts of both pitch tubes and beetles in the newly-infested bolts were then compared to see which had the greater amount of radioactivity.

Results indicate that tagged dispersing beetles can be traced by collecting and counting pitch tubes of newly-infested trees in the field.

MOORE, G. E. and J. F. TAYLOR.

1976. Tagging of the southern pine beetle with Phosphorus 32. Environ. Entomol. 5 (6): 1065-1067.

A Guide For Sampling

A guide for sampling within-tree beetle populations lets investigators design sampling plans according to the precision desired and the financial resources available. This guide describes two procedures for estimating within-tree populations of attacking adults, eggs, larvae, pupae-callow adults, and emerging adults.

The objective is to help investigators answer the following questions: (1) How many samples should be taken from a given tree to estimate populations within a given confidence interval? (2) From where on the tree should the samples be taken? (3) What calculations are required for a specific plan?

This guide includes statistical tables and step-by-step examples of the calculations.

COULSON, ROBERT N. et al.

1976. Procedural guide for quantitatively sampling within-tree populations of *Dendroctonus frontalis*. Texas Agric. Exp. Stn. MP-1267, 26p.

Some Highlights of 1976 Field Season

1. A flexible multistage sampling system for estimating infestations and the volume of wood contained in them has been pilot tested and is about ready for use.

2. The utilization potential for wood harvested from beetle-killed trees has been determined and economic analyses undertaken preparatory to developing management guidelines.

3. Progress has been made in developing economic models for impacts on timber, recreation, watersheds, and aesthetics.

4. Procedures have been developed in several states for estimating within-tree and within-infestation spot populations.

5. Much has been learned about macro- and micro-environmental factors affecting developmental rates of the beetle and insect-host interactions.

6. Oleoresin properties have been used to predict and test resistant and susceptible loblolly and short-leaf pines.

7. Studies of site/stand characteristics in several states have shown that forest type, stand condition, site index and stand density influence infestation incidence.

8. Several behavioral chemical fractions continue to be attractive in laboratory and field bioassays. However, beetle response varies seasonally.

9. Preliminary tests with two inhibitors successfully reduced landing on baited trees in a natural infestation.

10. Field tests of chlorpyrifos and chlorpyrifos-methyl provided promising results for both remedial and preventive control.

OTHER PUBLICATIONS OF INTEREST

Atkinson, T. H. 1976. Sampling populations of the southern pine beetle, *Dendroctonus frontalis* Zimmerman, for pathogenic micro-organisms and nematodes. M.S. Thesis. Univ. Fla., Gainesville. 77p.

Daniels, R. F., W. A. Leuschner, and H. E. Burkhardt. 1976. Modeling the impact of the southern pine beetle. Va. J. Sci. (Abstr.) 27:32.

Lane, L. L. 1976. Management information system for southern pine beetle research. Ph.D. Thesis. Univ. Ark., Fayetteville. 176p.

Plummer, E. L., T. E. Stewart, K. Byrne, G. T. Pearce, and R. M. Silverstein. 1976. Determination of the enantiomeric composition of several insect pheromone alcohols. J. Chem. Ecol. 2: 307-331.

Pulley, P. E., J. L. Foltz, A. M. Mayyasi, and R. N. Coulson. 1976. Topological mapping to estimate numbers of bark-inhabiting insects. Environ. Entomol. 5: 640-643.

Publications partially or wholly supported by the Southern Pine Beetle Program.

U. S. DEPARTMENT OF AGRICULTURE
SOUTHERN PINE BEETLE PROGRAM
ALEXANDRIA FORESTRY CENTER
2500 SHREVEPORT HIGHWAY
PINEVILLE, LA. 71360

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

U.S. DEPT. OF AGRICULTURE
AN EQUAL OPPORTUNITY EMPLOYER
RECEIVED

POSTAGE AND FEES PAID
U. S. DEPARTMENT OF
AGRICULTURE
AGR-101



THIRD CLASS

MAR 31 1982

PROCUREMENT SECTION
CURRENT SERIAL RECORDS

Integrated Pest management RD & A Program
for Bark Beetle of Southern Pines